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WHAT CAUSED "BLIGHT" ON CHRISTMAS TREES IN THE NORTHERN ROCKIES IN 1947?

By

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Widespread occurrence of damage, known locally as "blight", in young Douglas-fir Christmas tree stands of Montana, northern Idaho and eastern Washington in the fall of 1947 was the cause of serious losses to the Christmas tree industry. For example, a 24-percent drop in output of Christmas trees in Montana in 1947 was partially attributed to that cause. 2/ Many trees were seriously discolored, some lost their needles in advance of time for cutting, and still others lost their needles following cutting. Indications point to recurrence of the damage in 1948. Hence, available information on causes and possibilities for control are reported here.

Contrary to common belief, "blight" was not caused by a single factor. Rather, it was caused by a number of different factors or agencies active at the same time. A needle disease, insects, and premature cutting, before the needles had become dormant, all seem to have played a part in creating the "blight" condition. Cooperation from several kinds of scientific specialists was required to find the explanation.

1/ The information in this report was compiled largely from observations and reports by members of cooperating public agencies, especially Dr. Thomas W. Childs, Pathologist, U. S. Dept. of Agriculture, Bureau of Plant Industry, Soils and Agr. Engineering; Dr. Charles W. Waters, Montana State University; Philip C. Johnson, Entomologist, U. S. Dept. of Agriculture, Bureau of Entomology and Plant Quarantine; and L. S. Matthew, Farm Forester, U. S. Dept. of Agriculture, Soil Conservation Service.

2/ Christmas Tree Shipments Drop 24 Percent, by M. B. Dickerman, Northern Rocky Mountain Forest and Range Expt. Station, Research Note No. 59, January, 1948.

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The disease and insects involved have not received much attention in the past because ordinarily they do not cause serious damage. They are native to the region. Abundance depends upon weather and other conditions that favor their development. Formerly, major commercial interest in trees was focused upon sawtimber. Hence, damage to the foliage was considered to be of little importance. Foliage, however, is the stock in trade of Christmas tree producers.

Disease

A fungus disease known as Douglas-fir needle blight, Rhabdocline pseudotsugae Syd., was responsible for much of the discoloration and needle fall which occurred in the Douglas-fir stands. The disease was irregularly distributed. In some stands infection was so severe, on practically all trees, that no crop could be cut in 1947. In other stands, infection was present on most of the trees but was usually so light that neither the number nor the grade of the crop was much reduced. This irregularity may have been the result of variation in infection conditions from one locality to another, or it may indicate that trees in some stands are more resistant than those in other stands. In any event, the disease occurred extensively in western Montana.

Douglas-fir needle blight is a native disease. It may be recognized by the following characteristics: One-year-old (or sometimes two-year-old) needles are mottled with purple, red brown, or orange spots; fruiting bodies appear in the spring, or sometimes in the fall, as small cushions or blisters on both sides of the mid-vein on the underside of the needle, or sometimes on top of the needle; brown, spore-bearing fungus tissue is exposed during wet spring weather by rupture of the epidermis of the needle; repeatedly infected trees have sparse foliage, often with only the needles of the current year present during late summer.

Abnormally wet weather, when the new needles are forming, appears necessary to permit new infection by the disease. Hence, during a series of wet springs, infection increases; during a series of dry springs it subsides. It appears likely that the disease will be more destructive this year (1948) than last. Its bad effects will be apparent for some years to come, because many of the needles that normally remain on the trees five years or longer have been lost. A succession of wet springs, such as we are now experiencing, is not likely to cause much mortality unless the weakened trees are attacked by other parasites.

No other diseases of importance were observed on Douglas-fir.

No direct control measures seem practicable at this time.

Indirect methods of reducing damage seem feasible, however, since the grower can take advantage of the conspicuous differences in susceptibility which exist between individual trees. In thinning and pruning, and particularly in the selection of growing stock to be used for "turn ups", the least

susceptible trees should be favored and the most susceptible ones eliminated from the stand. The present policy of cutting the most dense and best-looking trees, while the inferior ones are left undisturbed in the hope that they may eventually furnish a crop, may not be good business in the long run.

The present abundance of infection makes this a very good season in which to recognize resistant trees. Even where no cultural work is planned, the grower should examine his stands at this time in order to determine the extent of infection and what his chances are of getting a crop this fall.

Insects and Mites

Several insects and a spider mite seem to be associated with the "blight" condition. The most important of these are: (1) the Cooley gall louse, Adelges (Chermes) cooleyi Gill., (2) a spider mite, Paratetranychus sp., and (3) the pine needle scale, Phenacaspis pinifoliae Fitch. Each of these is capable of killing small Douglas-fir trees. While all three were found during 1947 in almost all parts of the blighted areas, they are not believed to have been primarily responsible for the discoloration or dropping of the needles. To find out more about the damage which may be attributed to insect and mite attack, further detailed observations are being made by the Bureau of Entomology and Plant Quarantine in 1948.

Several sprays and a dust are effective in controlling these insects and the mite. Applications of the spray, however, under forest conditions, is apt to require spraying equipment beyond the means of small tree owners. Aerial spraying may hold promise for control in the future.

Cooley gall louse

Examination of Christmas tree stands early in June, 1948, showed heavy concentrations of newly-hatched lice on young 1948 needles in some areas. Fortunately, this heavy infestation does not appear to be too widespread. Damage from the Cooley gall louse, alone, should not be great enough to interfere seriously with the harvesting of Christmas trees in 1948.

Damage to needles is caused by the feeding habits of the louse. By sucking the juices from the cell tissues of the needles, the insect causes a small yellowish area to form on the outer surface of the needle at each feeding point. These appear pale yellowish green early in the summer, but gradually change to a reddish brown later in the season. Thus, the needle has a splotchy appearance. Quite often, too, the needle is bent abruptly at the feeding point. In its most conspicuous form, the insect appears on the underside of Douglas-fir needles as small cottony tufts.

Control is most difficult, because of a rather complicated life history. The application of a miscible oil spray during the short period of time of the early developmental stages has been recommended as giving satisfactory control.

Spider mites

These minute creatures are so small that they can rarely be seen by the naked eye. They feed by sucking plant juices from the new needles and twigs.

Damage, caused by the feeding of the mites, frequently appears as an even fading of the entire new needle growth. Needles, thus affected, usually dry out and fall to the ground in late summer or early fall.

The life history of the mite on Douglas-fir is not well known in the Northern Rocky Mountain Region.

Sulfur dust or sulfur spray are recommended for direct control. Spider mites, however, are ordinarily not abundant where the young Douglas-fir trees are maintained in a healthy growing condition.

Pine needle scale

This insect is common to many western conifers. It attacks mostly the smaller trees, especially along dusty roads.

The mature scales are white, pear-shaped and about 1/8-inch long. Eggs are laid in the fall and remain all winter under the female scale. The eggs hatch in the spring and the new scales become full grown by midsummer. The scale is ordinarily not abundant on Douglas-fir.

Kerosene emulsion or tree distillate emulsion are effective sprays for controlling this insect.

Additional information may be obtained by writing to the USDA Division of Forest Pathology, Bureau of Plant Industry, Soils, and Agricultural Engineering, Portland, Oregon, about the diseases; or to USDA Forest Insect Laboratory, Bureau of Entomology and Plant Quarantine, Coeur d'Alene, Idaho, about forest insects and spray formulae.

Early Cutting

In order to handle an increasing production of Christmas trees, there was considerable pressure to increase the length of the cutting season by advancing the starting date. In 1947, cutting in parts of Montana started several weeks in advance of the normal starting date, October 10, the approximate time, it is believed, that the trees usually become dormant. The fall of 1947, however, was characterized by unusually warm and moist weather. Thus, early cutting and delayed dormancy probably contributed heavily to the premature fall of needles.

Frost

Some Christmas tree operators believed that discoloring and dropping of needles in 1947 were caused by frosts. However, the studies made during the past ten months do not support this belief.

Summary

Extensive damage to the needles of Douglas-fir Christmas trees in the northern Rocky Mountains during 1947 caused serious losses to the Christmas tree industry. They appear to have been caused by a combination of several factors, including a needle disease, insects and a spider mite, and premature cutting. Prevention of damage by the needle disease, insects and spider mite is not economically feasible under forest conditions. Damage is likely to be severe again in 1948, due to weather conditions favorable to the growth of the parasites. Operators are advised to make preliminary surveys to locate areas where damage is so severe as to make cutting impossible or unprofitable in 1948.